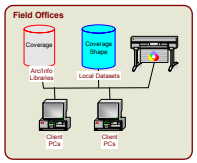
Integrated Technologies Supporting an ArcGIS Transition

Moving from Coverages to Geodatabases

The Bureau of Land Management has maintained our corporate GIS database in distributed ArcInfo libraries for a number of years *(Figure 1)*. We are now transitioning to our target IT architecture *(Figure 2)* using ArcSDE and ESRI's geodatabase model. Our corporate database will now be maintained within a centrally-hosted ArcSDE instance at our regional office. Our field office users are at various stages of readiness for this implementation. Therefore, we must continue to support both systems during the transition period. Our transition architecture *(Figure 3)* includes distribution of a replicated copy of the corporate database delivered as coverages on field office servers. This coverage-based dataset will encourage use of the ArcGIS software during the transition. Use of ArcInfo libraries will continue until the geodatabase design is fully implemented and application software is transitioned. To help manage this transition period, we have integrated multiple web technologies and processes for updating, delivering, and reviewing our spatial data.

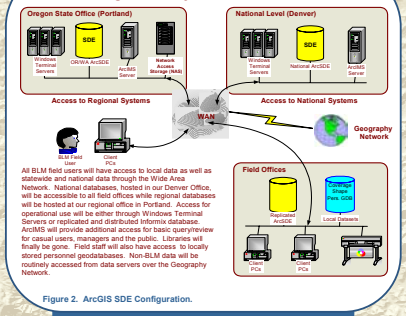
BLM - Oregon/Washington Initial GIS System Architecture



The Oregon State Office of the BLM first built a corporate GIS architecture in 1994 based on a distributed system of ArcInfo Libraries. The libraries were hosted on AIX servers in 13 separate field offices throughout the region but were remotely administered from the regional office in Portland. Numerous applications were developed in AML and most project work and data storage all took place at the field office.

Figure 1. Librarian configuration

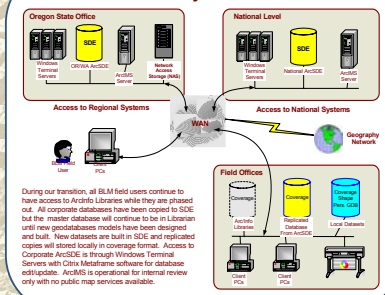
Target GIS System Architecture



All BLM field users will have access to local data as well as statewide and national data through the Wide Area Network. National databases, hosted in our Denver Office, will be accessible to all field offices while regional databases will be hosted at our regional office in Portland. Access for operational use will be either through Windows Terminal Servers or replicated and distributed Informix database. ArcIMS will provide additional access for basic query/review for casual users, managers and the public. Libraries will finally be gone. Field staff will also have access to locally stored personnel geodatabases. Non-BLM data will be routinely accessed from data servers over the Geography Network.

Figure 2. ArcGIS SDE Configuration.

Transition GIS System Architecture



During our transition, all BLM field users continue to have access to ArcInfo Libraries while they are phased out. All corporate databases have been copied to SDE but the master database will continue to be in Librarian until new geodatabases models have been designed and built. New datasets are built in SDE and replicated copies will stored locally in coverage format. Access to Corporate ArcSDE is through Windows Terminal Servers with Citrix Metaframe software for database edit/update. ArcIMS is operational for internal review only with no public map services available.

Figure 3. Transition Configuration.

Updating the Land Use Allocation Theme during an ArcGIS Transition

Land use planning is the reason we built our initial GIS system and continues to be where we find new and innovative ways to use and expand our use of spatial data. With constant change in land status and modifications to current land use allocations, it was recently necessary to update our land use themes in Western Oregon related to the Northwest Forest Plan (NWFP). The NWFP, first developed in 1994, designated numerous land areas as having restrictions to timber harvest, recreation, public access or wildlife habitat. Various spatial land use themes were created as single coverages that allowed for overlapping polygons without using regions. The need to update these land use themes was the first project where we started to have field editors use Citrix Terminal Servers to access our SDE database and allowed managers and data stewards to see and review the work through ArcIMS.

The BLM in Oregon has been a long time user of ESRI software for managing our land use data and have done so in a distributed environment with data capture, storage and editing performed at various field offices. The work has been accomplished with ArcInfo Librarian managing the storage and transaction environment on AIX servers in 13 different field office locations. This system has worked well but had numerous limitations that we hope to eliminate with the transition to a BLM Enterprise GIS solution based on the new ArcGIS architecture. With hundreds of custom applications written in AML, a large work force trained in Arc/Info 7.x and Arcview 3.x, and Librarian managed data, it is a daunting task to transition to the new world of SDE, ArcIMS and object based programming.

This poster shows some of the various technologies and tools that were used to help make this transition less painful and smoother as we gain experience and practice with ArcGIS.

Figure 4. Web page of layer status by field office.

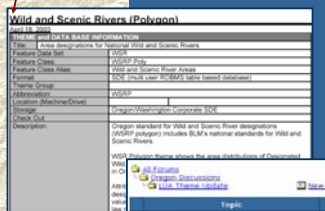


Figure 6. Detailed information about layer.

Figure 5. Web form for submitting metadata.

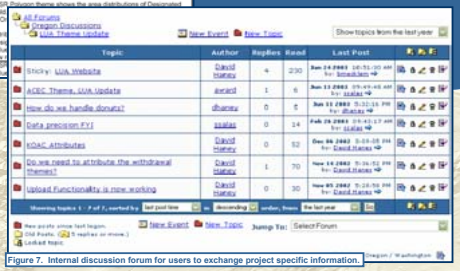


Figure 7. Internal discussion forum for users to exchange project specific information.

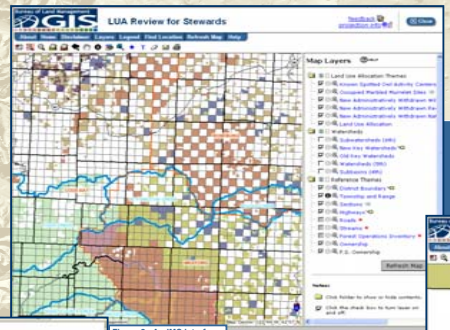


Figure 8. ArcIMS interface.

Figure 9. Identify All reveals layer information.

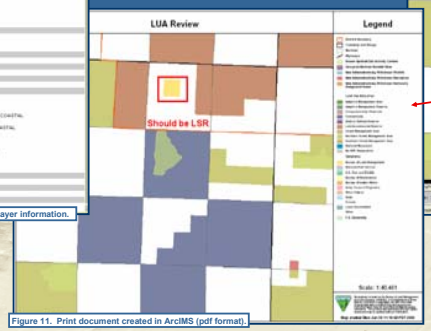


Figure 11. Print document created in ArcIMS (pdf format).

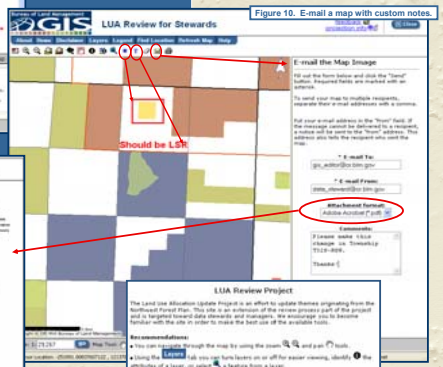


Figure 10. E-mail a map with custom notes.

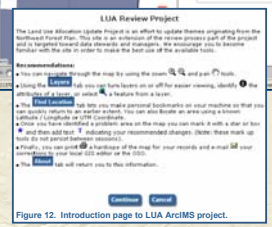


Figure 12. Introduction page to LUA ArcIMS project.

Collaborative Review and Edit Process

ArcIMS enables both GIS and non-GIS personnel involved in the update process to quickly and easily assess symbolized data of interest alongside base information. An introduction page *(Figure 12)* helps familiarize users with the toolset in ArcIMS. Within the ArcIMS site *(Figure 8)* users have the flexibility to zoom, define the visibility of layers, look at attribute information, etc. An Identify All tool allows for single clicking anywhere and returns all layer information at that point on the map *(Figure 9)*. In addition, a Data Steward can add text to the map and e-mail this added information to their GIS editor for update *(Figure 10)*. Likewise, GIS editors can highlight question areas that to be need reviewed by the Data Steward. With multiple offices across the state, this functionality facilitates quicker communication and reduces the need for mailing paper maps. However, if a paper map is desired, the user can print a pdf map that shows the date/time of creation as well as Bureau disclaimer and logo *(Figure 11)*.

Exchanging Information/Data

To help with the development of these new datasets during transition it was invaluable to have web-based tools to manage the project. Field editors could retrieve instructions and data standards *(Figure 6)*, deliver datasets for central consolidation and loading into SDE *(Figure 4)*, input forms allowed for automated xml-based metadata creation *(Figure 5)*, and a discussion forum enabled peer based support and shared experiences *(Figure 7)*.

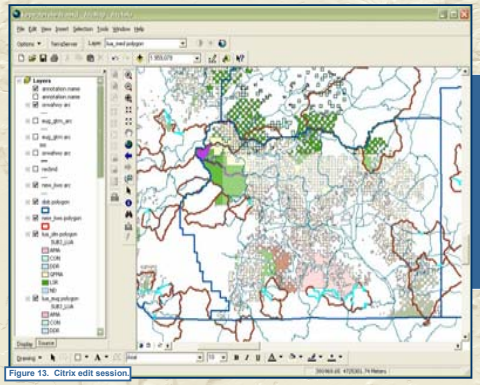
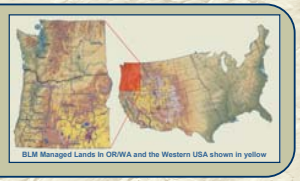


Figure 13. Citrix edit session.

Centralized Editing

With a centrally located SDE database, it is necessary to perform edits and access the database over a local area network for adequate performance. But the knowledge about the field data required editors to be in each field office. We initially allowed edits to be completed locally in coverage format and had them all submitted to the regional office for consolidation. We then loaded them into SDE and notified all field editors to launch ArcMAP through Citrix to review and edit the new SDE feature datasets *(Figure 13)*. Editors were allowed to create versions and make updates which were then reconciled by a single editor and reviewed by the state data steward.

The **Bureau of Land Management (BLM)**, an agency of the U.S. Department of Interior, manages over 261,000,000 acres of public land in the Western USA with approximately 13,000 employees in 180 field offices including 10 regional offices and 5 national centers. The BLM sustains the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations. To meet this mission, the use of GIS has expanded rapidly and we have recently begun to implement an Enterprise GIS system based on ESRI's ArcGIS architecture. Oregon and Washington, with the regional office located in Portland, OR, has been a leader in the implementation of ArcGIS technologies for the Bureau.



BLM Managed Lands In OR/WA and the Western USA shown in yellow

Software/Hardware Used for Project

Client Apps	ArcGIS 8.2, Desktop and Workstation Internet Explorer, Citrix ICA
Map Server	ArcIMS 4.0 and Apache on SUN Fire 280R Moxi Media's IMF for ArcIMS 4.0
SDE Server	ArcSDE 8.2 Informix on IBM AIX P660 Informix version 9.30.UC2
Web Server	Microsoft IIS on Dell Poweredge 2550 Snitz Forums 2000
Terminal Server	Citrix Metaframe XP on Dell PowerEdge 2550

LUA Update Project Team

Project Manager	David Haney - BLM GIS Specialist
ArcIMS Developer	Shelley Moore – BLM GIS Specialist
SDE Developer	Steve Salas – GIS Program/Analyst, Titan Systems
Web Developer	James Whitcomb – Web Programmer, Titan Systems
Citrix Developer	Kiet Nguyen – BLM GIS System Administrator
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Created: July 7, 2003 by: dhaney file: esri2003.ppt